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Learning in Motion:

The Promise of School–based Kinesthetic Learning Interventions

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Learning in Motion:

The Promise of School-based Kinesthetic Learning Interventions

by

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Report

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Master of Education

The University of Texas at Austin

May 2011

Dedication

A Dios.

Para mi querido esposo, mi amor, sanidad y estabilidad.

Para mis papas, gracias por todos los años de apoyo.

Para todos “mis niños” que fueron la inspiración de este reporte.

Acknowledgements

This report would not have been possible without the input, wisdom and encouragement of Dr. Claire Ellen Weinstein and Dr. Leslie Moore. Thank you for your patience, dedication and emotional support.

Abstract

Learning in Motion:

The Promise of Kinesthetic School-based Learning Interventions

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The University of Texas at Austin, 2011

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Learning styles may play an important role in how students learn. Three primary types of learning styles are visual, auditory and kinesthetic. Visual learners prefer to see information to process and retain it. Auditory learners prefer to listen to or discuss information and kinesthetic, learners use their bodies and movement to take in knowledge. Students can learn through any modality, but some researchers argue they do so most effectively when their particular learning style is accommodated.

Several populations of students that may be labeled as underachievers, possibly due to their preferences not matching the classroom environment. Visual and auditory learners are most frequently catered to within the classroom. Seemingly, students with kinesthetic learning preferences are often not given the chance to move and experience lessons. This prevents them from using their preferred style which allows them to concentrate on the task at hand and keeps them challenged. Experiential learning also allows students to connect classroom content to real-world applications. Educators,

including school counselors, have a responsibility to educate students, teachers and parents about learning styles. Counselors can also advocate for students with different learning styles. Diversifying teaching and counseling interventions to accommodate student learning styles will help American schools function more effectively.

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INTRODUCTION

Teachers in modern classrooms are pressured by several external factors. Nationally and statewide, a strong emphasis is placed on standardized test performance (Botwinik, 2007). At a local level, teachers must accommodate to the mandated curriculum of school districts. Many school and classroom goals are numbers-based, and teachers face the daunting task of meeting and exceeding standards (Botwinik, 2007).

As educators manage expectations from their school and state, stressors become prioritized (Caillier, 2010). Classroom effectiveness is strongly influenced by the demands placed on teachers. Implementing curriculum and achieving adequate yearly progress may become more important than the individualized needs of students. Accommodating students' learning styles is one example of a student-focused approach that is often set aside. Recognition and accommodation of learning styles may no longer be a priority in a classroom driven by test scores (Caillier, 2010).

Learning styles can be defined in several ways. Researchers vary in their approaches to learning styles. Seeing learning styles as a physiological and environmental response (Dunn, 1984; Dunn, et al., 1993; Dunn & Stevenson, 1997), as a dual-axis cognitive style (Riding & Reed, 1996), or as being highly influenced by certain personality traits (Jackson, et al., 2008; O'Connor & Jackson, 2008). In light of such theoretical perspectives, this report will define learning styles as the way a student takes

in new or challenging information through primary senses, while still recognizing the influence that some personality characteristics may have on learning.

The way a student learns may be affected by environmental, social and emotional factors. Dunn, Griggs, & Price (1993) defined several components of learning styles. Environmental factors like sound, light and temperature are ways that students react to their physical learning environment. Students display varying levels of emotional needs and stability. Social preferences like working alone or in groups, as well as student-teacher relationships also comprise aspects of learning styles. Additionally, students vary on the basis of physiological preferences (Dunn, et al., 1993). The way students take in knowledge through their senses, and their optimal productivity times greatly affect the medium through which they learn best. Finally, each student also processes the information they receive differently. Many of the factors that contribute to an individual learning style affect how a student reacts in a given learning situation reference.

Students take in knowledge in several different forms. Since the methods used to present material are flexible, this paper will focus on the effectiveness of appealing to a student's physiological learning style. Physiological aspects of a learning style include whether a student most effectively takes in information visually, auditory, or kinesthetically. Visual learners take in and retain information through sight. They prefer to see the material they are learning, and remember effectively with the use of pictures and video (Lincoln & Rademacher 2006; Yildirima, Acarb, Bullcand, & Sevincb, 2008). Auditory or aural learners process information through the sense of hearing. They may use listening and verbalizing as intake and retention strategies (Lincoln & Rademacher,

2006; Yildirima, et al., 2008). Kinesthetic learners prefer working hands-on with information, and using movement to retain knowledge (Lincoln & Rademacher 2006; Yildirima, et al., 2008). Researchers have found that some students employ more than one method of learning in the classroom (Chen, 2009; Lincoln & Rademacher 2006).

Recently, research on experiential methods has shown them to be an effective way for students to learn (Jarmon, Traphagan, Mayrath, & Trivedi, 2009; Muir & van der Linden (2009); Ng, Van Dyne, & Ang, 2009; Piercy, 2010; Pistole, Kinyon, & Keith, 2008). While there is still debate around the construct definition of experiential learning, some researchers find a lot of overlap with kinesthetic learning activities (Illeris, 2007). . However, for the purposes of this paper, Kinesthetic learning strategies and Experiential learning strategies will be presented parallel each other. Since research does not support a direct overlap, they will both be presented as promising learning interventions, especially for students who are not reaching their full academic potential.

Students' learning styles have been a topic of research for decades. Many researchers have called for the reform of programs for gifted children (McAllister & Plourde, 2008; Rayneri, Gerber & Wiley, 2006). Gifted students often become bored with typical classroom material and presentation (McAllister et al., 2008). Many suffer from under-achievement due to a disparity between their learning style and their school environment (Rayneri, et al., 2006). Some researchers have found that gifted children may learn better when material is presented dynamically or in real-world contexts (McAllister & Plourde, 2008; Rayneri, et al., 2006). Matching learning style to student learning preferences can help alleviate under-achievement in gifted students.

Notably, research on gifted children has been well documented. However, this focus on a privileged few has neglected the promise of kinesthetic learning for other student groups. A special focus of this report is on underachieving students. This group of students is defined, for the purposes of this paper, as those who are consistently functioning below state standards. Several factors may contribute to a student not reaching their academic potential: low socio-economic status, first generation American status and English Language Learning in the K-12 school system. Underachieving students may benefit from a variety of teaching practices, motor involvement while learning, and shorter attention activities (Braio, Beaseley, Dunn, Quinn, & Buchanan, 1997; Dunn, 1993). Additionally, applying curriculum instruction to life-based practices may help increase learning motivation and information comprehension in underachieving students (Ng, et al., 2009; Piercy, 2010; Pistole, et al., 2008). The use of various learning mediums has been shown to increase students' achievement levels in a variety of classroom settings (Connors & Perkins, 2009; Dunn, 1984; Rayneri, et al., 2006; Wolf, 2007).Teachers are responsible for providing students with the content knowledge they need. An availability of classroom resources, teacher training and administrative support is necessary to help students learn in the classroom (Wolf, 2007). With the proper support, teachers can integrate a variety of learning style strategies into a classroom and still present the necessary material for adequate performance on national standardized tests (Connors & Perkins, 2009). The responsibility of appropriately integrating knowledge with student preferences falls onto teachers and counselors.

Currently, the research field lacks empirical research on experiential learning practices with underachieving students. Biographical accounts of programs have been published (Bergmann & Sams, 2009; Brown, 2003; Reese, 2010). However, relatively few quantitative, peer-reviewed studies (Connors & Perkins, 2009; Shirilla, Gass, & Anderson, 2009; Somers, 2006; Walker, Downey, & Cox-Henderson, 2010) exist to show the effects of experiential learning programs with under-achieving students. This area is a definite gap in the research field.

Considering the promise of alternative learning strategies for students, especially those who are not achieving their full potential, I have several goals for this report. First, to provide an examination of different learning styles with a particular focus on kinesthetic learning. Experiential learning will also be discussed as an active learning strategy. Second, I will present a discussion and commentary on the current research in the field. Third, I will describe the state of research and knowledge on kinesthetic and experiential learning applications, especially those for under-served populations. Finally, the implications and possible benefits for teachers and counselors will be discussed.

LEARNING STYLE PREFERENCES

To begin the discussion of learning and learning styles, definitions for the purpose of this paper will be outlined. Learning style preferences can be defined as a favored way that a student prefers to learn a given subject. For the basis of this paper, learning style preferences are focused on the physiological sense(s) a student uses to effectively conceptualize learning material. Visual, auditory and kinesthetic intake processes will be discussed. Since kinesthetic learning is of special importance to the researcher, Kinesthetic learners are students who prefer to use some type of movement, broadly defined, to help them learn and understand new material. Teachers looking to address these learners may do so by incorporating movement into a lesson. This could be through role playing, a field trip or something as simple as throwing a ball to class members when it is their turn to talk. The physical activation of a student's body may help them focus and take in new information.

Additionally, the concept of experiential learning will be introduced. Teaching students through current real or hypothetical cases, or relating new content to previous experiences, is an effective way to engage students. From personal experiences with students, as well as research findings (Coats & Taylor-Clark, 2001), underachieving students have complained about the lack of connection between classroom content and real life. Experiential learning may be a promising way to make learning more appealing and applicable in the lives of underachieving students. In this report, for the aforementioned reasons, experiential learning will be presented alongside other learning style strategies as a potential achievement aide for underachieving students.

Understanding how learning occurs is essential prior to discussing learning styles. As an individual is presented with new information, there is a balance between the content of the learning experience and the students' incentive to learn the material (Illeris, 2007). In addition to this content-incentive balance, the individual is also interacting with his or her environment (Illeris, 2007). The environment may include physical surroundings, cultural norms, values of learning, and so on. If any portion of this learning process is hindered, by internal or external factors, knowledge acquisition can suffer (Illeris, 2007).

Several factors can create a roadblock for an individual's learning path. One barrier that may exist between students and effective learning is missing content while it is taught, or mislearning (Illeris, 2007). Mislearning can be caused by inattention, a deficiency of pre-requisite knowledge, or poor communication between teacher and student (Illeris, 2007). A second place where learning may fail to occur is with a lack of incentive to learn (Illeris, 2007). Whether students are overwhelmed because they function below grade-level, suffer from boredom or believe they are incapable of mastering the material, they have insufficient motivation to attend to learning in the classroom. A final roadblock that can exist between students and learning is cognitive opposition to the information being presented (Illeris, 2007). A student may not believe the lesson applies to them, that they will never use it or that they simply dislike a given subject. Whether one or several of these learning blocks are present in a students' life, school personnel are responsible for teaching despite such barriers.

One way that teachers can attempt to reach students is by eliminating some of the aforementioned barriers. Addressing student learning styles or varying teaching methods to appeal to various learning styles are methods of engaging students in learning (Braio, et al., 1997; Geisler-Brenstein, Schmeck, & Hetherington, 1996). Examples of varying teaching methods could be incorporating audio-visual components into lessons, allowing students to teach each other or integrating movement around the classroom while teaching. Also, by presenting material through a variety of methods, students may be more interested the material or can access the new information being taught more easily.

Learning style components can play a role in a person's ability to receive information effectively. Dunn & Stevenson (1997) defined learning style as the way each person takes in, interprets and remembers new and complex information. Riding & Reed (1996) view learning style as a balance between knowledge intake and knowledge perception. Other researchers incorporate the interaction of personality traits, like emotional independence and impulsivity, into learning styles (Jackson, et al., 2009; O'Connor & Jackson, 2008). Further still, other researchers define learning styles as a fluid, strategic interaction between cognitive processing, emotional involvement and regulation (Vermunt & Vermetten, 2004). For the purposes of this paper, learning styles are viewed as the way students take in information, and recognize that some personality characteristics and situational changes influence learning style for students. When learning styles are matched to the method of teaching, some research suggests that more effective and enjoyable learning occurs (Dunn, 1984; Morton-Rias, Dunn, Geisert, Mangione, Ortiz, & Honigsfeld, 2007; Vermunt & Vermetten, 2004). The most well-

known components of learning style are how a person takes in knowledge through their senses from their environment. Even anecdotally, many people have a sense of whether they identify as a visual, auditory or kinesthetic learner.

Visual learners have been found to be one of the most prevalent groups in the school-aged population (Chen, 2009). In a survey of 1000 elementary and high school students, visual learners comprised approximately 30% of the sample (Chen, 2009). By taking in information through the sense of vision, these learners often prefer to see the information in order to learn efficiently. While board writing and the use of an overhead projector are often utilized in American classrooms, this may fall short of some visual learners' predilections. Visual learners usually prefer the use of pictorial or graphic representation of information (Yilmaz-Soylu & Akkoyunlu, 2009). Examples include animations, flow charts, diagrams and video clips as notable ways to represent information for visual students. For students' visual encoding, teachers should create illustrative lessons.

A second subgroup of learning styles is the auditory learner. Students who use their sense of hearing to encode new or challenging information are placed in this category. These students are not the statistical majority of learners in the American classroom, as they represent approximately 25% of students (Chen, 2009). However, auditory learners tend to be the most catered to in the American classroom. When a teacher lectures to a class, the auditory learners benefit the most. These students can also benefit from discussion style classes because speaking and listening are promoted. Presumably, the farther a student advances through the education system, the more their

classes are catered toward auditory learners. For example, average high school classes involve far more lecture than the same subjects at a primary level. Once a student enters college and graduate school, the instruction is increasingly based on listening. For students who are not strong auditory encoders, other learning and recall methods may be more effective.

The final subgroup of students learns through interaction and the use of their bodies (Dunn, 1993). As cited in Chen (2009), kinesthetic learners comprised approximately 15% of a sample of 1000 elementary and high school students. Arguably, these learners receive the least amount of accommodation in the classroom, especially after elementary school. Kinesthetic learners prefer to use their whole bodies to interact with new information (Dunn, 1993). Kinesthetic students may learn best through role-plays, field trips and dynamic activities. There are several subgroups of students that may significantly benefit from kinesthetic learning and these will be discussed further.

One theory for the basis of learning style preferences may have to do with how information is encoded in the brain. Some researchers make the analogy that learning styles are similar to hand preferences (Sousa, 2006). A continuum of handedness ability exists similar to people's ability to effectively switch between learning methods. Sousa (2006) explains that people's learning preferences relate back to brain hemispheric preference. The stereotype of being a "right brained" artistic, visual, theorist may lead people to have stronger visual intake skills than others. Conversely, those who are naturally "left brained" may find analytic and problem solving tasks much easier; this may be related to a great efficiency of verbal or auditory processing. It is important,

however, to recognize that people lie on various points of a left brain-neutral-right brain spectrum (Sousa, 2006). As this applies to learning styles, it is important for educators to recognize both the natural and learned abilities of their students on this spectrum.

In summary, there is a myriad of research supporting learning style preferences. Individual learning differences and preferences should be taken into consideration by teachers. Teaching directed towards individual student preferences seems like an obvious concept, but in the hectic day-to-day class routine, it is often glossed over. For educational professionals, like teachers and school counselors, to take individual differences into account as much as possible will help students learn more efficiently.

CURRENT RESEARCH

Learning styles have been a subject of interest for decades by researchers. This research has produced several studies which fall on a continuum of beliefs about learning style preferences. Some reports claim learning styles are fixed and unchangeable; some experts believe they are ingrained parts of our personality; others see learning styles as fluid and coachable skills (Hall & Moseley, 2005). Despite the breadth of views on the topic of learning styles, a number of researchers and practitioners continue to advocate for their particular beliefs.

At the most rigid end of the learning style spectrum, researchers see learning styles as fixed styles and based on the senses one uses to take in new information. This viewpoint is supported by researchers like Rita Dunn, where visual, auditory and kinesthetic modalities are primary components of learning style. As some of the more popular theories on learning styles, these beliefs provide a foundational component for this report; however, other research has expanded the outlook on learning.

Several researchers have devoted their careers to providing evidence for the validity of learning style and increased student success when learning styles are accommodated. Dunn & Stevenson (1997) compiled several studies in which college students took the Learning Styles Inventory (LSI) or the Productivity Environmental Preferences Survey (PEPS) to determine their learning style. In the literature review by Dunn & Stevenson (1997), students were divided into two types of study-skills groups: the control groups were provided typical study skills and experimental groups were taught how to complete homework based on their determined learning style (Dunn &

Stevenson, 1997). One of the studies in this meta-analysis compared 605 community college students who were given the PEPS to 484 control students who did not receive any learning style information. The results conclude that students who received additional information about their learning style preferences and accommodations achieved significantly better than the control group not exposed to the information (Nelson, Dunn, Griggs, & Primavera, 1993). Interestingly, this study suggests that teachers do not have to alter curriculum to cater to students' learning styles; students can achieve academically simply through homework prescriptions on their own. An additional benefit to this research compilation was the fact that learning-style based homework recommendations were advantageous for both average and at-risk students (Dunn & Stevenson, 1997). One major limitation to this study is that little detail was provided on the participants of the studies. Secondly, no detail was provided about what the homework prescriptions entailed for students. Additionally, all of the meta-analysis studies used the LSI and PEPS, both of which have been critiqued for their reliability and validity (Ferrell, 1983). Despite the limitations of this meta-analysis, Dunn & Stevenson (1997) suggested that completing homework based on a learning-style prescription could improve student achievement and attitudes toward learning.

Some conceptualizations and research in learning styles goes deeper into the theory of learning. Riding and Read (1996) see learning less as our senses at odds with each other and more as student preferences lying on two axes. Cognitive style axes are defined as wholistic-analytic and verbal-imagery (Riding & Read, 1996). Students' preferences on the wholisitic-analytic axis are determined by how they chunk information

together; wholistic learners see the big picture of the information being presented, whereas analytic thinkers see the information in smaller steps or pieces (Riding & Read, 1996). The verbal-imagery axis exemplifies how students' represent information in their minds. In the broad sense, the verbal-imagery axis builds upon a relationship between Dunn's (1984; 1993) visual and auditory learners. These students, automatically or with some practice, encode the information in terms of pictorial cues or verbal/written cues.

To further expand upon the theory of learning styles, some researchers believe learning is closely tied to personality. They believe that personality characteristics, such as impulsivity, emotional control, anxiety and self-reliance, are intertwined with students' ability to learn (O'Connor & Jackson, 2008). If a student deals with high anxiety or an external locus of control, believing that such personality traits would not influence learning seems short-sighted. According to Jackson's hybrid model of learning in personality, the higher levels of impulsivity a student exhibits, the less functional learning that will occur (Jackson, et al., 2009; O'Connor & Jackson, 2008). Conversely, students who maintain emotional independence, with the ability to regulate behavior, may be more effective learners (Jackson, et al., 2009; O'Connor & Jackson, 2008). The concept of looking at learning through an individual's temperament and character sheds light on how productively the student may be learning (Jackson, et al., 2009; O'Connor & Jackson, 2008). According to this theory, a student's learning character is comprised of both biological and environmental factors, which educators should be aware of (O'Connor & Jackson, 2008).

Several assessments of learning styles have been found to be reliable and valid measures of learning style indicators. For example, the Learning Styles Profiler (LSP) measures individuals' levels of responsibility, impulsivity, emotional independence and practicality. Studies show that responsibility is significantly correlated with emotional independence and practicality/job performance. Additionally, these three subscales are significantly inversely correlated with impulsivity (O'Connor & Jackson, 2008). Jackson, et al. (2009), also argue that student grade point average (GPA) can be predicted with the measurements from the LSP. The study performed with Ugandan and Australian students showed that students' GPAs were significantly correlated with students who were labeled emotionally intelligent learners. Additionally, GPA was negatively correlated with all other learning types, such as sensation seekers or goal-oriented achievers (Jackson, et al., 2009). It seems that if students were to take the LSP, educators would capture a snapshot of personal control over a learning environment and potential success. Like other researchers have found, once learning styles can be defined, educators can help build students up in areas of deficit for stronger academic performance.

Finally, theorists on the most fluid end of the learning style spectrum view learning as an interaction between multiple variables across several situations. Learning strategies are believed to be based on cognitive processing, affective involvement and metacognitive regulation (Geisler-Brenstein, et al., 1996; Vermunt & Vermetten, 2004). In any given learning situation, the aforementioned factors play into the way a student learns. Cognitive processing relates to the strategies students use to incorporate new

information, like comparing and contrasting information, or identifying main points (Geisler-Brenstein, et al., 1996; Vermunt & Vermetten, 2004). Weinstein, Zimmerman, & Palmer (1988) theorized that a student's affective involvement while learning relates to whether they feel positively, negatively or in a neutral way about the subject matter being taught (Vermunt & Vermetten, 2004). Third, metacognitive regulation, which can originate internally or externally, can be defined as all of the tools students employ to motivate themselves or tolerate the frustration of learning new material (Vermunt & Vermetten, 2004). A final point that is crucial to this theory of learning strategies is that people's strategies can increase with exposure to learning situations and often change over time and achievement level (as cited in Vermunt & Vermetten, 2004).

Learning styles are not set in stone. Research shows that most students have the ability to learn through visual, auditory or kinesthetic modalities; however, the efficiency of the students' learning is dependent upon their particular learning style (Braio, et al., 1997; Chen, 2009). Some students may also change their learning style preferences as they age (Chen, 2009). Based on developmental theories, some researchers believe that young learners are biased toward movement-based learning. As students age, their visual and auditory systems mature and they can increasingly use such modalities to their advantage. Beliefs like these provide an explanation for why kinesthetic learners are provided fewer accommodations as they age through the school system. It is important to note, however, that some students retain their kinesthetic preferences. Developmental-based learning style preference opinions may also cause schools to fall short of many students' needs.

Unlike developmental-based learning style research, constructivist theories may allow students more adaptive control over their learning style preferences. Constructivism states that students construct or create their own picture of learning (Koekoek, Knoppers, & Stegemen, 2009). They do not simply take in what is being presented to them; rather, each student incorporates the information they learn into a web of previous experiences and contexts (Illeris, 2007). Following the idea of constructing their own web of knowledge, this may provides an example of why students may use a variety of learning strategies, depending on the subject at hand. Students can be taught new and effective strategies for learning, and they should work effectively as long as they help a student integrate new information into the previous web of knowledge.

Constructivist Theory also supports the notion that learning happens socially, but that the individual learner takes responsibility for sustaining knowledge and comprehension of a subject (Illeris, 2007; Koekoek, et al., 2009). Since learning occurs in the context of social and cultural factors (i.e. group vs. individual learning), the process and encoding differs for each student's experience (Illeris, 2007). The premise of this theory may help advise educational professionals about the implications of learning style preferences in the classroom. Teachers are encouraged to understand how each of their students interprets the learning assignments. Moreover, students are given the power of their own learning, according to Constructivist Theory (Koekoek, et al., 2009). Students choose the meaning behind any information they take away and how to retain knowledge from any given learning opportunity (Koekoek, et al., 2009). Additionally, the student decides how much effort to put into a particular task. This concept adds a complexity to

teaching, but may be beneficial for teachers to understand so that children's learning needs are being addressed.

Many studies have attempted to find correlations between learning styles and gender, ethnicity or culture. Mixed conclusions exist between studies on such topics. One study of 154 college students pursuing health-related majors found that learning differences in relation to ethnicity showed minimal differences (Morton-Rias, et al., 2007). The study also concluded that there were greater differences in learning style between males and females than between various ethnicities (Morton-Rias, et al., 2007). The study concluded that teaching and assessment styles may be a reason why schools see males and ethnic minorities having greater difficulties in school. Unfortunately, the small sample size of the study was composed of college-level students who were not diverse enough to represent the population of the local community. One possible assumption is that even the males and ethnic minorities eligible to participate in the study had already achieved a certain education level and were thereby capable of navigating the teaching styles of the standard education system. Attempting to draw generalized conclusions around ethnicity or gender and learning style preference may be interesting to the research field; however, for instruction it is still important to be aware of individual preferences.

One study showed the benefits of hands-on learning for underachieving students. Braio, et al. (1997) structured a five phase intervention in fourth, fifth and sixth grade, urban, low socioeconomic English/Language Arts classrooms with underachieving and special education students. Each phase lasted two weeks and coincided with a content

unit in the classroom curriculum. A total of 106 students, twenty-five from regular education and eighty-one from special education, were selected based on their special education status or as being considered two grade levels behind their chronological age on the Metropolitan Achievement Test (MAT) (Prescott, Balow, Barr, & Hogan, 1986). The racial make-up of the study was approximately 31% African American, 41% Hispanic, and 29% Whites or others; no indication of how this sample represented the community was provided. At each phase throughout the study, students were given a pre-test and post-test to measure the amount of content knowledge learned about the curriculum topic of that particular week. All students participating were measured for environmental and mobility learning preferences with the LSI (Dunn, Dunn, & Price, 1990) and Semantic Differential Scale (Pizzo, 1981). During Phase One, baseline data were collected and teachers did not implement any learning style-based accommodations. Baseline data showed the amount of content knowledge, on average, each student learned during typical classroom instruction. During the baseline week, teachers gave scripted lectures and used board work, text books and ditto assignments. During Phase Two of the experiment, only environmental accommodations, such as sitting on a beanbag in a softly lit area of the room or getting permission to occasionally move around, were made to baseline teaching methods. Throughout the third phase of the study, all students participated in experiential activities with the content material, such as floor games or learning task cards. During Phase Four, learning-style based accommodations were made, but teaching practices returned to baseline with scripted lecture, board writing and book reading. During the final phase of the experiment, the teaching style remained at

baseline and all accommodations were taken away. Results of the study showed greater knowledge retention, and learning enjoyment at weeks two, three and four, according to the pre and post content tests and the SDS which measured student opinions of learning accommodations. The highest amount of learning and enjoyment occurred during the third phase of movement-based teaching instruction for all students. In summary, these findings suggest that underachieving children learned the most while being physically activated during content instruction.

Before addressing the idea of experiential learning, one must be able to define the construct being discussed. Illeris (2007) set out to do such a task. It is known that experiential learning can occur in K-12 schools, adult education programs, as well as the workplace. Previous researchers have outlined several indicators related to successful experiential learning programs: the experience must be valuable to the learner in time and environment, the learner is to some extent self-directed and given freedom from distraction, the experience is learner-based, and the experience can be applied to numerous situations in the learners' cogitative functioning (Illeris, 2007). Simply put, experiential learning may be defined as "learning in which the learning dimensions of content, incentive and interaction are involved in a subjectively balanced and substantial way" (Illeris, 2007). Examples of Experiential Learning could include a second life project, a mock trial or a business project.

One proponent for experiential learning in the classroom argues that case-based learning techniques (i.e., the Oregon Trail game in elementary school, or business start-ups at any age) have long-term advantages for students. Georgiou, Zahn and Meira

(2007) suggest that case-based learning presents real-world issues to students, and facilitates the use of skills like problem solving and critical thinking. By presenting conceptual theories to students and then allowing them to integrate such knowledge through experiential cases—whether inside or outside the classroom—students are provided the opportunity to critically digest the information they are taught. By balancing traditional teaching with experiential learning, students practice how to handle real-world situations and problems.

IMPLEMENTING EXPERIENTIAL EDUCATION

ACADEMIC PROGRAMS

Several studies have examined the effectiveness of experiential learning in the classroom. Some classrooms have implemented technology to increase the amount of experiential learning that can occur. In a rural Colorado school, Bergmann & Sams (2009) began video/pod-casting (vodcasting) their 11th grade Chemistry lectures for students to listen to before class. Since the lecture was online, students were expected to listen to the vodcast before the class meeting; therefore classroom time could be spent on chemistry experiments, one-on-one assistance and small group work. Qualitatively, the teachers reported noticing an almost immediate deeper conceptual knowledge the students took away from the experiential class format. Though the program is in its infancy, the school was able to decrease the prerequisites for the course and quantitatively achieve equal test scores to previous years. Despite initial positive results, when planning to implement this type of program in the schools, several considerations must be taken into account. A limitation of this study is how applicable it would be in under-resourced schools. Internet access and ample, quality free time to listen to the thirty to forty-five minute lecture outside of school are required for every student to succeed in a program like this one. The teachers reported technological solutions for students who did not have high-speed internet access to view the lecture; however, this is still a limitation for those without computer access. Experiential programs like this one could benefit students, and this study shows the promise that such programs could have in schools.

A peer-reviewed study was conducted for at-risk, underachieving students. An experiential math and science based camp, REAL Camp (named after the Rockford Educational Alliance), was held for twenty-six selected high school students in Illinois. Students were chosen by high school and university faculty associated with the REAL Project based on their lack of effort and academic success in high school and potential to succeed beyond high school. Walker, et al. (2010) studied the results of the four-day, university setting camp. To assess the students' experience, researchers provided Likert-type rating scales, where 1 was poor and 4 was excellent. Students rated the eight areas of instruction taught at the camp (means between 2.28 and 3.38). Students also rated the evening camp events which targeted post-secondary life, and all events received mean ratings between 3.03 and 3.81 (Walker et al., 2010). All students who participated in the camp graduated from high school, unlike the participating school's average completion rate which was only sixty-four percent. Additionally, about eighty-one percent of camp participants went on to some form of post-secondary education (i.e., a four or two year college, military, career training or other schooling) (Walker, et al., 2010). Despite the study's limitation of having a small sample size, the students who participated were positively affected. Transforming students from underachievers with poor school attitude to high school graduates altered the trajectory of these students' paths for life.

For a select population of students, work-based learning programs may provide both a kinesthetic and experiential educational program. Career and Technical Education Curriculum (CTE) and work-based learning (WBL) experiences have numerous benefits. Programs like CTE and WBL often provide students with shop skills, like automotive,

construction or electrical. Curriculum examiners have found that quality CTE programs have higher attendance and teach necessary life skills for students to take beyond high school graduation (Brown, 2003; Reese, 2010). In some instances, being able to train for a job at school can keep students from dropping out (Brown, 2003). Additionally, students who know that they want to specialize in electrical, automotive, mechanical or medical fields can learn practical skills, and create valuable relationships with community members already working in their field of study (Brown, 2003; Reese, 2010). While many CTE and WBL programs have been cut due to budgetary restrictions and No Child Left Behind testing pressures, these programs can keep non-traditional students in school and learning (Brown, 2003; Elliot, 2006). The importance of implementing such experiential programs can help students achieve personal goals and stay in school until graduation.

An elementary/middle school (grades K-8) in Boston promotes experiential-based curricula as its mission of teaching math and science to under-served inner city students. The Young Achiever's Math and Science Pilot School uses the parks and open spaces of Boston to breathe life into classroom lessons. Young Achievers' Adequate Yearly Progress reports show improvements between grades for nearly every cohort in language arts, math and science (cite report card). The school employs experiential learning activities on a regular basis to foster curiosity and responsibility for personal learning in the students' education. Students at Young Achievers learn through the democratic process, take field trips, attend after-school tutoring, and are taught content lessons through the nature and world around them. The school goes beyond content education;

character education for all students is integrated into curriculum. Also through interdisciplinary, experiential learning strategies, the school claims to foster concepts like wellness, social justice and a curiosity for learning in its students (Conners & Perkins, 2009).

Social Emotional Programs

The advantages of experiential education also apply to non-classroom subjects. Character building, interpersonal relationships and life decisions are also being influenced by experiential learning programs. One such curriculum, the Baby Think It Over program, seeks to use the experience of caring for a newborn to reduce teen pregnancy risk. Somers (2006) conducted a study measuring the effects of the Baby Think it Over program. 133 primarily white suburban high school students were given life-like dolls that cry at the frequency of a newborn child's needs. The students had to hold a key in the dolls back until it stopped crying. A post-test survey was conducted with students and parents. While the Baby Think It Over program itself did not produce significant results in teen pregnancy ideals, parents reported an increase in meaningful discussions about sex and pregnancy between themselves and their teenagers (Somers, 2006). It appears that the experience itself was not the learning tool, but a vehicle for important conversations to occur within family and friend groups. Educators and school counselors can implement experiential programs similar to this to benefit life skills and decision making education in schools.

Students may also gain from character education programs that utilize experience based programs. When comparing two similar adventure-based, social skills programs,

mixed results of their effectiveness have been found (Shirilla, et al., 2009). In one study, the RESPECT program followed a sixth grade cohort for two years at four different schools. Students' scores on the Social Skills Rating System (SSRS) were compared to neighboring schools who did not receive the RESPECT intervention. Scores for both the experimental and control group decreased significantly on the SSRS, but the control group decreased significantly more than the experimental group at the $p < 0.5$ level (Shirilla, et al., 2009). Additionally, Shirilla, et al. (2009) reported a similar study called 4H Bear Hill, which did have significant results. For the 4H Bear Hill study, small significant effect sizes were seen at first, but there was significantly more of a difference between the experimental and control group during follow-up post-measures (Shirilla, et al., 2009). Despite mixed results, there appears to be a promise for future research in this area. Experiential learning for both academic and social-emotional learning has potential, but research-based interventions do not seem available to schools at this time.

IMPLICATIONS FOR EDUCATIONAL PROFESSIONALS

As school districts tighten budgets, schools will increasingly become a place of academic achievement, rather than learning. From personal experience in some school districts, students are required to take a double period of math or reading for higher test performance. For the students who are underachieving, electives are taken away and replaced with remedial content subjects in hopes that test scores increase (Elliot, 2007). Therefore, it seems important that stakeholders in the educational future of students are identified and advocating for students' needs. One way that educational professionals can do this is through their interactions with students. Incorporating kinesthetic activities into lesson plans or framing new material experientially may help underachieving students.

There are two primary groups of educators tasked with academic achievement. First and most obviously, are the teachers of core content classes (i.e. Math, Science, English/Language Arts, and Social Studies/History). With the increased pressure related to standards testing, teachers may feel pressured to drill content material so that their students perform well. Unfortunately, this does not allow as much personalized instruction in most classrooms. Instead of instructing solely for high-stakes tests, what if teachers provided meaningful learning experiences so that individual students could learn to their greatest potential. As several studies have shown, catering to students' learning styles can have beneficial results on academic achievement.

Another group of educational professionals responsible for academic success are school counselors. The American School Counselors Association (ASCA) describes part

of a school counselor's job as being a daily part of the educational environment and partners of academic achievement (American School Counselor Association, 2009). School counselors are charged with four functions: guidance curriculum (whole school instruction), individual student planning (one-on-one or small group services), responsive services (crisis, referrals, etc.), and system support (professional development, team building, etc.). Two of these functions, guidance curriculum and individual planning, allow counselors to interact directly with students. These are opportunities for counselors in the school to incorporate kinesthetic or experiential methods into student interaction. The school counselor's role as a systems support specialist is another way to involve kinesthetic or experiential methods in the school. Helping teachers, instructional coaches and administrators understand and implement learning style preferences can create a culture of knowledge around the topic. In fact, several of the ASCA standards closely apply to learning style preferences: A.A1.5, A.A2.4, A.B1.6 and A.C1.3 (American School Counselor Association, 2004). These four guidelines closely relate to student learning style, and ASCA clearly promotes student knowledge of learning styles.

School counselors are capable of interventions at several different levels with the student body: for the whole student body, for small groups of students with greater need, and with individual services. Counselors can develop learning style interventions to enhance student learning. At a campus-wide level, educating students and teachers about learning styles can bring awareness to the subject throughout the school. Addressing ASCA standards A.A1.5 and A.A2.4, school counselors help students identify "positive

behaviors that lead to successful learning" and use "knowledge and learning styles" to positively affect school performance.

Counselors can also consider kinesthetic and experiential learning style preferences when planning guidance activities. Activating the students, and creating some arousal through an experiential learning activity, like role plays, artwork or games, can increase the effectiveness of the lesson. Teaching social skills, decision-making and other non-academic topics through role-play can help students discover pro-social options in different situations. As part of a guidance activity, students and teachers may also be able to take a learning style preference inventory to identify their personal learning preferences. This would help teachers identify their own biases in teaching and allow them to see how their teaching methods affect students. Students could benefit from this knowledge by knowing themselves better. This awareness could help with their note taking, study habits, and homework routines. With greater awareness and attention around the subject of learning styles, schools may see higher quality classroom interaction and material retention.

On a small-group level, school counselors could provide academic advising or study skills to struggling students. With the knowledge of their learning style, school counselors could teach study habits based on students' strengths to smaller groups of students. Helping students physically interact with the material they're learning would activate their kinesthetic learning strengths. Additionally, counselors could help students link what they are learning to current or previous experiences to make the information more relevant and memorable. Interventions like this could help students struggling

academically to look at school in a different way. Even if their classroom experience stays the same, this small group interaction could empower students to direct their home learning experience. Homework, projects and studying can be done in their own way.

While counseling individual students, learning styles can also be integrated. One-on-one counseling interactions can use a myriad of techniques, and can be adapted to fit the learning preferences of the student (Dunn, et al., 1993). For the counselor who employs kinesthetic or experiential approaches, play therapy, art therapy, greater or less use of talking out the problem or even walking around the school while talking can activate different parts of a student's brain and help them better process the information being transferred during individual counseling services.

Under ASCA guidelines, counselors can create change in several domain areas. Providing a learning style through guidance curriculum instruction will help better educate the whole campus on learning issues. As students, teachers and parents know one more piece in the puzzle of their student's ability to learn, the child can receive better services for learning. Counselors also address individual planning issues while helping students structure their own world better. Finally, counselors can create a systems change in the school. By helping teachers become aware of student learning style preferences, instruction can expand beyond the scope of the standardized test.

CONCLUSION

The implementation of alternative teaching strategies in American schools seems beneficial. Research suggests that helping students access their learning style strengths could help them learn more efficiently (Dunn, et al., 1993; McAllister & Plourde, 2008; Rayneri, et al., 2006). As educational professionals, teachers and counselors should lead this charge. For gifted and average students, feeling accommodated may help the learning process. For underachieving students, addressing learning preferences more specifically may greatly advance their achievement levels.

Some studies suggest that students who are not achieving at grade level may prefer different classroom accommodations than their peers. Increased movement or relating the content material to a tangible experience may help underachieving students take in and process information more efficiently (McAllister & Plourde, 2008; Rayneri, et al., 2006). Allowing movement breaks during a class period, or having teachers incorporate movement into teaching time (like throwing or catching a ball, moving to different stations in the room, etc.) may help underachieving students both physically and cognitively. In a parallel vein, helping students relate better to the material they are learning helps them retain the information better. If a student believes that the content they are learning in class will never apply to them, it is natural for them to disengage from the lesson. Subsequently, they may become bored in class and look for other stimuli to occupy their class time. This disengagement and distraction is not only detrimental to their own learning process, but often to their classroom peers as well.

However, if a teacher can teach classroom content in an experiential way, underachieving students may have an increased motivation to stay engaged and learn in the classroom.

Beliefs about incorporating Kinesthetic or Experiential learning into the classroom are easier said than done. Experiential learning, especially, may require interdisciplinary learning opportunities, as research suggests (Georgiou, et al., 2007). The difficulty of coordination and implementation between core-subject teachers is apparent. With a myriad of stressors, many teachers may not have the time and energy to collaborate as much as Experiential Learning may require. Having to plan lessons together and understand how the material overlaps in multiple classes can be time consuming for teachers. However, the learning benefits for students arguably outweigh the teacher demands.

The research in the field of education on this area is not exhaustive. A majority of the research on Kinesthetic learning strategies is outdated. Additionally, few studies propose empirically validated ways to implement beneficial kinesthetic activities into elementary and secondary classrooms. Additional research should be conducted on effective and manageable ways to involve movement into classroom lessons, especially for middle and high school students who are expected to stay seated most of the day.

Further research is also needed for elementary, middle and high schools using Experiential education. Much of the research on Experiential learning is conducted with college students. This is a selective population to conduct research on, especially since not everyone goes to college and once people enter college they are divided into majors and career paths. The narrow pool of research participants makes such Experiential

Learning studies difficult to generalize. Arguably, students of all ages have experiences that teachers can use to build on. Even elementary-aged students can relate things that they know to the content they learn in the classroom. Research for Experiential Learning with middle and high school students may also overlap with dropout prevention. For students, especially those who are underachieving, who do not feel that school applies to their current or future lives, helping link experiences with classroom content may be the hook to keep them in school. There is great potential for Experiential Learning in the K-12 school setting, but research has not fully explored this area.

Appendix A: ASCA National Standards for Students

(COMPETENCIES AND INDICATORS)

Legend: A:A-1.1 = Academic Domain: Standard A - Competency 1. Indicator 1

Academic Development

A:A1 Improve Academic Self-concept

A:A1.1 Articulate feelings of competence and confidence as learners

A:A1.2 Display a positive interest in learning

A:A1.3 Take pride in work and achievement

A:A1.4 Accept mistakes as essential to the learning process

A:A1.5 Identify attitudes and behaviors that lead to successful learning

A:A2 Acquire Skills for Improving Learning

A:A2.1 Apply time-management and task-management skills

A:A2.2 Demonstrate how effort and persistence positively affect learning

A:A2.3 Use communications skills to know when and how to ask for help when needed

A:A2.4 Apply knowledge and learning styles to positively influence school performance

A:A3 Achieve School Success

A:A3.1 Take responsibility for their actions

A:A3.2 Demonstrate the ability to work independently, as well as the ability to work cooperatively with other students

A:A3.3 Develop a broad range of interests and abilities

A:A3.4 Demonstrate dependability, productivity and initiative

A:A3.5 Share knowledge

Standard B: Students will complete school with the academic preparation essential to choose from a wide range of substantial post-secondary options, including college.

A:B1 Improve Learning

A:B1.1 Demonstrate the motivation to achieve individual potential

A:B1.2 Learn and apply critical-thinking skills

A:B1.3 Apply the study skills necessary for academic success at each level

A:B1.4 Seek information and support from faculty, staff, family and peers

A:B1.5 Organize and apply academic information from a variety of sources

A:B1.6 Use knowledge of learning styles to positively influence school performance

A:B1.7 Become a self-directed and independent learner

A:B2 Plan to Achieve Goals

A:B2.1 Establish challenging academic goals in elementary, middle/jr. high and high school

A:B2.2 Use assessment results in educational planning

A:B2.3 Develop and implement annual plan of study to maximize academic ability and achievement

A:B2.4 Apply knowledge of aptitudes and interests to goal setting

A:B2.5 Use problem-solving and decision-making skills to assess progress toward educational goals

A:B2.6 Understand the relationship between classroom performance and success in school

A:B2.7 Identify post-secondary options consistent with interests, achievement, aptitude and abilities

STANDARD C: Students will understand the relationship of academics to the world of work and to life at home and in the community.

A:C1 Relate School to Life Experiences

A:C1.1 Demonstrate the ability to balance school, studies, extracurricular activities, leisure time and family life

A:C1.2 Seek co-curricular and community experiences to enhance the school experience

A:C1.3 Understand the relationship between learning and work

A:C1.4 Demonstrate an understanding of the value of lifelong learning as essential to seeking, obtaining and maintaining life goals

A:C1.5 Understand that school success is the preparation to make the transition from student to community member

A:C1.6 Understand how school success and academic achievement enhance future career and vocational opportunities

Career Development

C:A1 Develop Career Awareness

C:A1.1 Develop skills to locate, evaluate and interpret career information

C:A1.2 Learn about the variety of traditional and nontraditional occupations

C:A1.3. Develop an awareness of personal abilities, skills, interests and motivations

C:A1.4 Learn how to interact and work cooperatively in teams

C:A1.5 Learn to make decisions

C:A1.6 Learn how to set goals

C:A1.7 Understand the importance of planning

C:A1.8 Pursue and develop competency in areas of interest

C:A1.9 Develop hobbies and vocational interests

C:A1.10 Balance between work and leisure time

C:A2 Develop Employment Readiness

C:A2.1 Acquire employability skills such as working on a team, problem-solving and organizational skills

C:A2.2 Apply job readiness skills to seek employment opportunities

C:A2.3 Demonstrate knowledge about the changing workplace

C:A2.4 Learn about the rights and responsibilities of employers and employees

C:A2.5 Learn to respect individual uniqueness in the workplace

C:A2.6 Learn how to write a résumé

C:A2.7 Develop a positive attitude toward work and learning

C:A2.8 Understand the importance of responsibility, dependability, punctuality, integrity and effort in the workplace

C:A2.9 Utilize time- and task-management skills

Standard B: Students will employ strategies to achieve future career goals with success and satisfaction.

C:B1 Acquire Career Information

C:B1.1 Apply decision-making skills to career planning, course selection and career transition

C:B1.2 Identify personal skills, interests and abilities and relate them to current career choice

C:B1.3 Demonstrate knowledge of the career-planning process

C:B1.4 Know the various ways in which occupations can be classified

C:B1.5 Use research and information resources to obtain career information

C:B1.6 Learn to use the Internet to access career-planning information

C:B1.7 Describe traditional and nontraditional career choices and how they relate to career choice

C:B1.8 Understand how changing economic and societal needs influence employment trends and future training

C:B2 Identify Career Goals

C:B2.1 Demonstrate awareness of the education and training needed to achieve career goals

C:B2.2 Assess and modify their educational plan to support career

C:B2.3 Use employability and job readiness skills in internship, mentoring, shadowing and/or other work experience

C:B2.4 Select course work that is related to career interests

C:B2.5 Maintain a career-planning portfolio

Standard C: Students will understand the relationship between personal qualities, education, training and the world of work.

C:C1 Acquire Knowledge to Achieve Career Goals

C:C1.1 Understand the relationship between educational achievement and career success

C:C1.2 Explain how work can help to achieve personal success and satisfaction

C:C1.3 Identify personal preferences and interests influencing career choice and success

C:C1.4 Understand that the changing workplace requires lifelong learning and acquiring new skills

C:C1.5 Describe the effect of work on lifestyle

C:C1.6 Understand the importance of equity and access in career choice

C:C1.7 Understand that work is an important and satisfying means of personal expression

C:C2 Apply Skills to Achieve Career Goals

C:C2.1 Demonstrate how interests, abilities and achievement relate to achieving personal, social, educational and career goals

C:C2.2 Learn how to use conflict management skills with peers and adults

C:C2.3 Learn to work cooperatively with others as a team member

C:C2.4 Apply academic and employment readiness skills in work based learning situations such as internships, shadowing and/or mentoring experiences

Personal/Social Development

Standard A: Students will acquire the knowledge, attitudes and interpersonal skills to help them understand and respect self and others.

PS:A1 Acquire Self-knowledge

PS:A1.1 Develop positive attitudes toward self as a unique and worthy person

PS:A1.2 Identify values, attitudes and beliefs

PS:A1.3 Learn the goal-setting process

PS:A1.4 Understand change is a part of growth

PS:A1.5 Identify and express feelings

PS:A1.6 Distinguish between appropriate and inappropriate behavior

PS:A1.7 Recognize personal boundaries, rights and privacy needs

PS:A1.8 Understand the need for self-control and how to practice it

PS:A1.9 Demonstrate cooperative behavior in groups

PS:A1.10 Identify personal strengths and assets

PS:A1.11 Identify and discuss changing personal and social roles

PS:A1.12 Identify and recognize changing family roles

PS:A2 Acquire Interpersonal Skills

PS:A2.1 Recognize that everyone has rights and responsibilities

PS:A2.2 Respect alternative points of view

PS:A2.3 Recognize, accept, respect and appreciate individual differences

PS:A2.4 Recognize, accept and appreciate ethnic and cultural diversity

PS:A2.5 Recognize and respect differences in various family configurations

PS:A2.6 Use effective communications skills

PS:A2.7 Know that communication involves speaking, listening and nonverbal behavior

PS:A2.8 Learn how to make and keep friends

Standard B: Students will make decisions, set goals and take necessary action to achieve goals.

PS:B1 Self-knowledge Application

PS:B1.1 Use a decision-making and problem-solving model

PS:B1.2 Understand consequences of decisions and choices

PS:B1.3 Identify alternative solutions to a problem

PS:B1.4 Develop effective coping skills for dealing with problems

PS:B1.5 Demonstrate when, where and how to seek help for solving problems and making decisions

PS:B1.6 Know how to apply conflict resolution skills

PS:B1.7 Demonstrate a respect and appreciation for individual and cultural differences

PS:B1.8 Know when peer pressure is influencing a decision

PS:B1.9 Identify long- and short-term goals

PS:B1.10 Identify alternative ways of achieving goals

PS:B1.11 Use persistence and perseverance in acquiring knowledge and skills

PS:B1.12 Develop an action plan to set and achieve realistic goals

Standard C: Students will understand safety and survival skills.

PS:C1 Acquire Personal Safety Skills

PS:C1.1 Demonstrate knowledge of personal information (i.e., telephone number, home address, emergency contact)

PS:C1.2 Learn about the relationship between rules, laws, safety and the protection of rights of the individual

PS:C1.3 Learn about the differences between appropriate and inappropriate physical contact

PS:C1.4 Demonstrate the ability to set boundaries, rights and personal privacy

PS:C1.5 Differentiate between situations requiring peer support and situations requiring adult professional help

PS:C1.6 Identify resource people in the school and community, and know how to seek their help

PS:C1.7 Apply effective problem-solving and decision-making skills to make safe and healthy choices

PS:C1.8 Learn about the emotional and physical dangers of substance use and abuse

PS:C1.9 Learn how to cope with peer pressure

PS:C1.10 Learn techniques for managing stress and conflict

PS:C1.11 Learn coping skills for managing life events

Appendix B: Learning Style Assessments

Dunn Learning Style Inventory (LSI)

The Dunn LSI is self-report survey for students in third through twelfth grade (Dunn, 1987; Ferrell, 1983). It was originally created for elementary-aged students, but is now used with students through high school and college. The test is composed of 104 items that students rate on a five point Likert scale, which should reflect their emotional and physical preferences while learning (Dunn, 1987; Ferrell, 1983). Examples of items include "I study best when it is quiet," "I can ignore sound when I study," "It's hard for me to sit in one place for a long time," "I concentrate best when I feel cool," "I like studying with lots of light," "I think classes are very worthwhile," and "I like to learn new things" (Dunn, 1987; Ferrell, 1983). The survey should take between thirty and forty minutes to complete (Dunn, 1987). The assessment measures four basic subscales, which qualify how a student responds to their "immediate environment, own emotionality, sociological needs and physical requirements" (Ferrell, 1983). The results produce a profile for the test-taker to outline a learning environment that is conducive to the individual's particular learning style (Ferrell, 1983).

The Dunn LSI has been criticized psychometrically by researchers. In a factor analysis of the Dunn LSI, Ferrell (1983) had 471 high school and community college students complete the Dunn LSI, among other learning style assessments. The subjects of this study were from the Midwestern United States, and gender samples were equally represented (Ferrell, 1983). This study found that no visible relationship existed between the four factors they extracted (Environmental Aspects, not named, Restless Orientation,

and Positive Orientation) and the four subscales outlined by Dunn (Immediate Environment, Own Emotionality, Sociological Needs, and Physical Requirements). Ferrell (1983) concluded that this failed to prove the validity of the measure. One limitation to this critique is that the subjects were rather homogenous and older than the sample used by Dunn originally.

Productivity Environmental Preferences Survey (PEPS)

The Productivity Environmental Preferences Survey was designed by Dunn, Dunn & Price (1979, 1990). It was created as a complement to LSI, but for the post-high school population. It has been used in several studies with college students and adults (Dunn, 1987). The PEPS is a 100 item, self-report survey, much like the LSI (Dunn, 1987).

At the time this report was written, no studies on the psychometric properties were available to this researcher. Additionally, the researcher contacted Dr. Kenneth Dunn, co-writer of the PEPS, in the Educational Leadership program at Queens College, New York. At the time of publication, no correspondence had been returned.

Learning Styles Profiler (LSP)

The Learning Styles Profiler aims to measure the known overlap between personality and learning (O'Connor & Jackson, 2008). It was designed to measure four separate subscales: Impulsivity, Emotional Independence, Responsibility, and Practicality (O'Connor & Jackson, 2008). Examples of items on the assessment, respectively, are

"Do you generally do and say things without stopping to think?" "Do you often feel that you have little influence over the things that happen to you?" "Can you always fully be relied upon?" and "Do you like work that involves action rather than profound though and study?" (O'Connor & Jackson, 2008). Each of the four scales contains twenty-items, for a total of 80 questions on the test (O'Connor & Jackson, 2008). With the results from this assessment, one could interpret how a student's behavior may relate to their learning efficacy (O'Connor & Jackson, 2008). For example, if a student is high on the Impulsivity subscale, they may struggle to maintain attention throughout a lesson. Additionally, the type of material a student is interested in may be shown through their score on the Practicality subscale; a "practical" student may be more interested in learning material that directly relates to their life.

O'Connor & Jackson (2008) conducted two studies to measure the exploratory factor analysis and criterion-related validity of the LSP. The participants for the two studies were 3,779 workers and students from the United Kingdom and Australia over a two-year period. The participants had a mean age of 31.2, standard deviation of 9.9 years and were split 64% male and 36% female. The study concluded through exploratory and confirmatory factor analysis that the assessment was a sound instrument to measure Jackson's theory (O'Connor & Jackson, 2008). The LSP was found to have high internal consistency reliability and predictive validity (O'Connor & Jackson, 2008). Further research is still required, however, to further validate aspects of Jackson's (2002) theory.

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